[SEO CHAPTER \h \r 1][ADVANCE \y 63]UNITED STATES ENVIRONMENTAL PROTECTION

AGENCY REGION III

1650 Arch Street

Philadelphia, Pennsylvania 19103-2029

DATE: November 22, 2002

SUBJECT: Inspection Report of the Edgar Thomson Plant in Braddock, PA.

FROM: James W. Hagedorn, Environmental Scientist, Air Enforcement Branch

VIA: Richard Killian, Environmental Engineer, Air Enforcement Branch

TO: Chris Pilla, Chief, Air Enforcement Branch

and

File Room

Address:

US Steel- Edgar Thomson Works 13th Street and Braddock Avenue Braddock, Pennsylvania 15104

EPA Air Enforcement Branch Personnel

Richard Killian, Environmental Engineer, EPA, 215-814-2159 James Hagedorn, Environmental Scientist, EPA, 215-814-2161 Richard Eaton, Environmental Scientist- Wheeling, WV Office-304-234-0265

US Steel Personnel Participating During the 2 Day Inspection

Tom O'Toole- USS Environmental Department Manager, Mon Valley Works- 412-675-7380 Martin Angelini, Environmental Department- 412-273-4730 Ken Sapos, USS Plant Manager- Edgar Thomson Plant- 412-273-7010 Darryl Offer, USS BOP Manager-Edgar Thomson Plant- 412-273-7263 Dan Andrews, USS BOP Shop, Edgar Thomson Plant- 412-273-4700 Dan Parlam, USS Blast Furnace Maintenance, 412-273-7511 Walt Weiner, Blast Furnace Management Alex Drain, Power House Supervisor

USS Consultant-Air/Compliance Consultants, Inc.

James E. Phillippi, Senior Project Manager, 412-826-3636



Allegheny County Health Department Personnel

Bill Rausch- 412-578-7968

Date of Inspection: October 30 and 31, 2002. EPA arrived on site at about 8:30 AM

Overview

The United States Steel (USS) Edgar Thomson plant produces both iron from blast furnaces and also steel slabs through the use of a Basic Oxygen Process (BOP) Shop and a Continuous Castor Operation. The plant is located in Braddock, Pennsylvania and was originally founded by Andrew Carnegie, who eventually formed USS. This is one of the only places left in Pennsylvania that still operates blast furnaces for producing pig iron. EPA has an agreement (Consent Decree) with USS governing the allowable emission rates from the plant and requiring the completion of numerous environmental projects at this facility.

Narrative

James Hagedorn, Richard Killian, and Richard Eaton of EPA arrived on-site at about 8:30 AM and proceeded to check in . Also invited was the Allegheny County Health Department whose inspectors routinely visit the Edgar Thomson plant to evaluate their compliance status. The three EPA inspectors presented credentials /identification badges to the Company personnel at the main BOF Shop gate and waited for Tom O'Toole and Martin Angelini to escort us to a conference room. EPA explained that the purpose of the inspection was to gather data regarding plant operations/emissions and EPA would later review the data to determine any violations of federal or state environmental regulations. These regulations included the County regulations covering fugitive emissions from process equipment; visible emissions from control equipment; NSPS compliance; permitting regulations and New Source Review/Prevention of Significant Deterioration of Air Quality (NSR/PSD) regulations. All EPA representatives gave brief summaries of their technical background. Then the Edgar Thomson representatives proceeded to explain their roles and how long they worked for the Company.

During the opening meeting, the Agency representatives indicated that EPA would like to take photographs of the facility and would supply copies of the photos to the Edgar Thomson officials for their review. EPA explained that an inspection report would be prepared after the inspection and sent to the Company for their records and comment if necessary in case any information was not accurate or the Company wanted to make any Confidential Business Information claims. EPA indicated that the officials would be getting a copy of the report within 60 days if possible. EPA also said that the Agency would send a copy of the inspection report to the Allegheny County Health Department along with the photos. The Agency personnel also

indicated that EPA would be writing a compliance analysis of Edgar Thomson and this analysis is not releasable to anyone outside of EPA.

The inspection plan was to spend two days looking at the EdgarThomson plant where the first day would be used to have an opening meeting and to look at the BOF Shop operations, including hot metal transfer to mixer, hot metal transfer to ladle, hot metal desulfurization process, hot metal transfer to BOF vessel, steel scrap charge to BOF vessel, Oxygen Blow for Steel Conversion, Steel Tapping from the BOF vessel, and Continuous Castor operations. The second, and final, day would be used to look at the Blast Furnace Operations, including both the skip car charging of material into the Blast Furnace and the casting operation of drilling the tap hole at the bottom of the Blast Furnace and directing the molten iron and slag to different places. A discussion of the capital projects done at the Power House was also held prior to the end of this inspection. Numerous photographs were taken on both days. EPA personnel were stationed inside the BOF Shop and Blast Furnace casthouse to monitor inside operations and emissions and EPA personnel were also stationed outside these buildings for observations of visible/fugitive emissions escaping into the ambient air outside.

Seventy photographs were taken at the facility of all major operations- BOF, Blast Furnaces, Castor. These are enclosed in the report as "Attachment B".

The information on the Edgar Thomson facility in the following paragraphs was provided to EPA by Edgar Thomson personnel during the two-day inspection from October 30-31, 2002 as follows below. Mr. O'Toole and Mr. Angelini provided an in-depth description of the process and most of the information contained in this report included in the enumerated paragraphs to follow.

*Please note that all information provided by Edgar Thomson personnel and identified by them as confidential business information (CBI) is noted in *bold italic*.

- 1. The USS Clairton facility, which has always supplied Edgar Thomson with the coke for its blast furnace operation, is being bought by Apollo Investments, in large part, although USS will still retain some ownership interest in the facility. Minnesota Taconite operation is also included in the deal as well.
- 2. As we were going to be watching the casting operation, we asked what the casting schedule was at the present time. The plant was doing about 4-5 casts on the daylight shift at each blast furnace and the plant was running two blast furnaces, namely, No. 1 and No. 3.
- 3. The blast furnace burden is made up of coke, iron ore and limestone. The coke is used as both a fuel and a reducing agent for converting the iron oxide ore to elemental iron metal. The limestone is used for conditioning the slag and for removing impurities, such as sulfur, out of the molten iron. The process requires oxygen, so, a blast of hot air (wind) is sent

thru the burden at a rate of 100,000 cubic feet per minute for about 2-3 hours prior to emptying the iron from the furnace bottom. The molten iron is separated from the slag by drilling the taphole at the bottom of the refractory at the bottom of the blast furnace and allowing the molten metal to flow out of the blast furnace through a series of troughs into a submarine car positioned underneath the casting floor. Meanwhile, the slag flows in a different direction due to the density difference of the material and into an outside pit where the slag cools and is, eventually, dug out and sold for road subgrade. The Langenfelder Company has been handling the slag from Edgar Thomson for a very long period of time. According to the Charge Model Run that was given to us at the Blast Furnace, the furnace slag is largely SiO2, Al2O3, CaO, MgO, TiO2, with some alkali and some sulfur.

- 4. The Edgar Thomson operation consists of receiving molten iron (a.k.a hot metal) from the blast furnaces into a hot metal mixer in the BOP Shop; the hot metal is then transferred to a ladle and then desulfurized via a process where a chemical (Magnesium Carbide) is injected into the metal bath and the resulting reaction produces a sulfur compound that is lighter than iron and, hence, floats to the top of the ladle. This material is then skimmed / raked off of the top of the ladle and segregated. The desulfurized hot metal is then charged into a BOP vessel that has already been loaded with scrap steel. The scrap charge makes up about 20% of the total weight of the final heat. The USS personnel stated that the scrap comes from Tube City and USS buys various grades of steel scrap for different products. The next step is the lowering of an oxygen lance into the vessel, once it is positioned under the primary collection hood, and pure oxygen is blown into the vessel for a period of around 18 minutes. The oxygen is generated by a plant run by BOC Gases that is right on USS property. Once the blow has stopped, they take a sample of the steel and send it for analysis. If the analysis comes back within product specification, the vessel is turned around to pour the molten steel out into another ladle which is taken either to the ladle metallurgy station for fine tuning the steel composition or to the vacuum degasser. Once these steps are finished, the steel ladle is taken to the continuous castor where it is emptied, via a tundish, onto the two castor strands in a continuous stream for producing semi-finished steel slabs. Irvin Works does the final finishing operation on the slabs turning them into steel coil which is shipped to customers.
- 5. This plant has a lot of particulate emission control equipment for both the BOF Shop and the blast furnace operations as follows: for the BOP Shop: a wet scrubber for particulate control during the primary (blow) portion of the process; a baghouse for control of the metal desulfurization; a baghouse for control of the hot metal transfer operation and another baghouse for control of BOP Shop roof emissions that escaped control by the primary collection hood. For the blast furnaces, a very large baghouse is used for control of taphole area emissions for both operating blast furnaces. This plant also uses flame suppression in the blast furnace casthouse to minimize the generation of iron oxide fume which also decreases emissions from the casthouse while iron is emptied out of the furnace. The theory behind flame suppression is to have gas burners at selected locations to use up the available oxygen in those areas to prevent the reaction of the iron with the ambient oxygen. This technology has been used successfully for many years in the steel industry.

The Company also uses an air curtain to further direct the fumes in the taphole area into the primary collection hood placed directly over the taphole area which improves the particulate capture efficiency of the control device. The primary scrubber utilizes a triple throat venturi system with each venturi being 6 feet tall, 4 feet wide and 15 feet long with 12 water sprays on each side. This system was just upgraded to improve the particulate removal efficiency as a Supplemental Environmental Project (SEP) that was contained in the agreement between EPA, Allegheny County, and the Company. One of the reasons for the inspection was to witness these projects in operation. The scrubber operates at a pressure drop of 70-72 inches of water to maximize particulate control and the liquid flow rate to the scrubber is maintained at 3800 gallons per minute on average.

- 6. There are two BOP vessels, named "F" and "R" vessels but only one of these was in operation the day that we evaluated the BOP Shop. The BOP operation basically generates generic steel but, in order to meet the very exacting customer specifications, this generic steel has to go to either a vacuum degasser for removing carbon dioxide etc. or to the ladle metallurgy facility where specific elements are added to produce specified properties in the steel that the customer needs. The ladle metallurgy facility uses three electrodes to maintain the molten metal temperature while the desired chemistry is being achieved.
- 7. The steel is taken in the ladle to the Continuous Castor and both Castor strands were operating the day that we were there. No emissions were witnessed in the Castor building. The Castor is a continuous operation for feeding molten steel to the tundish at a rate which ensures that molten metal is always being fed to the castor even during periods of ladle replacement. According to the Continuous Slab Caster Fact Sheet provided to us during the inspection, the capacity of the caster is 2.6 million tons of steel per year. The cost of the caster was 250 million dollars and it can produce a wide range of slab dimensions going from a length of 204 inches to 430 inches and a weight of 6.5 tons to a maximum of 37 tons. The heat size that the caster handles is 250 tons of steel using two tundish cars and a tundish size of 70 tons. The machine length is 126 feet, 5 inches and it is a dual strand type.
- 8. In general, even though a lot of emissions were being generated inside the buildings, very little was witnessed outside going into the ambient air. No violations of visible or fugitive emission regulations were witnessed during this inspection.
- 9. According to the USS personnel, minimills are starting to improve the steel quality and are strong competition to the Edgar Thomson mill. The next generation of technology is probably going to be near shape casting which produces thinner slabs which need far less finishing in a finishing mill, such as USS Irvin Works, than is required now.
- 10. The last thing done by EPA was to discuss the changes made to the Power House with Alex Drain and his staff at the Power House. This part of the plant has 3 Riley boilers rated at 350,000 pounds of steam per hour each which operate on both coke oven gas and blast furnace gas fuels, primarily, although some natural gas is needed at times. The

Company did a useful life analysis of the boilers and EPA requested a copy of the study along with other information on operational and physical changes made at the Power House.

This ended the physical inspection. To close out this inspection, a meeting was held with the Company personnel to thank them for their assistance and cooperation and to return safety

equipment belonging to the Company. The Company was informed that any additional questions on their part could be discussed with Chris Pilla, the Air Enforcement Branch Chief, at 215-814-3438. We provided the Company personnel with a list of documents that we wanted them to mail to us at the Philadelphia Regional Office.

We thanked the company for their hospitality and departed the site about 5:00 PM on Thursday, October 31, 2002.

Attachment A - Data / Documents Provided by Company

- 1. Attendance Log for Entrance and Closeout Meeting
- 2. Mon Valley Works Plant Operations Handout
- 3. Continuous Castor Handout on Operation
- 4. Power Boiler Schematic
- 5. Daily Report of Operations- Blast Furnace Energy
- 6. Heat Sheets for BOP Shop Operations
- 7. Blast Furnace Charge Model Runs
- 8. Mon Valley Daily Report of Operations-Energy Control

Attachment - B - PHOTO LOG

Photo #21- Burning CO from BF

Photo #1- Model of Castor Operation	Photo #23-Outside Slag Pit with Molten Slag
Photo #2- Another View of Model	Photo #24-Blast Furnace Outside Shot
Photo #3 - Castor Tundish and Operator	Photo #25-Same as #24
Photo #4-Steel Ladle and Tundish	Photo #26-Slag Cooling Outside BF
Photo #5-Steel Ladle at Castor	Photo #27-Outside View of Casthouse
Photo #6-Ladle and Tundish Connection	Photo #28-BF and Casthouse
Photo #7-Same as #6	Photo #29-Steam From Slagpit
Photo #8-Presses on Slab at Castor	Photo #30-Shot of Fan Inside Casthouse
Photo #9-Hot Slab at Castor	Photo #31-Trough Opening to Submarine
Photo #10-Dual Strand Operation at Castor	Photo #32-Start of Cast in Casthouse
Photo #11-Inside of Tundish	Photo #33-Same as #32
Photo #12-Castor Flux Powder Baghouse	Photo #34-Outside View of BF and Slabs
Photo #13-Another View of Castor	Photo #35-BOF Shop Roof Opening
Photo #14-Blast Furnace Stoves View Outsi	de Photo #36-Fume Escaping Control to Secondary Control System
Photo #15-Blast Furnace Control Room	Photo #37-New Scrubber Water Sprays
Photo #16-Blast Furnace Taphole Area	Photo #38-Same as #37
Photo #17-Casting Operation Inside B.F.	Photo #39- BOP Control Room
Photo #18-Iron to Submarine Under Floor	Photo #40- Control Room
Photo#19-Same as #18	Photo #41-Settling Pond for Scrubber Water
Photo #20- Fume From Iron Casting	Photo #42-BOP Scrubber System

Photo #43-Hot Metal Mixer

Photo #22-Wind Pipes to BF	Photo #44-BOP Vessel	
Photo#45-Ladle of Desulfurized Iron	Photo#62-Raking Sulfur From Hot Metal	
Photo #46-Steel Scrap to be Charged Into BOP Vessel	Photo #63-Steel Scrap Waiting For Charge	
Photo #47-Dumping Steel Scrap into Vessel	Photo #64-Fume From Hot Metal Transfer	
Photo #48-Hot Metal Ladle Suspended	Photo #65-Fume to Primary Emission Collection Hood	
Photo #49-Pouring Hot Metal Into Vessel	Photo #66-New Seamless Design Ductwork From Primary Hood	
Photo #50-Hot Metal Fume From Vessel	Photo #67-BOP Shop and Steel Slab Area	
Photo #51-Blowing Oxygen Into Vessel	Photo #68-BOP Area Roadway	
Photo #52-Another View of #51	Photo #69-Huge Crane in Outside Area	
Photo #53-Transfer Metal From Mixer to La	dle Photo #70-Spare Oxygen Lance and Roof Opening to Secondary Control System	
Photo #54-Emission Control Car for Hot Metal Transfer		
Photo #55-Hot Metal Transfer to Ladle		
Photo#56-Hot Metal Desulfurization Lance		
Photo#57- Pulling Desulf Lance Out of Ladle		
Photo #58-Same as #57 From Another Angle		
Photo#59-Hot Metal Transfer Finished		
Photo #60- Hot Metal in Ladle		
Photo #61-Steel Tapping From BOF Vessel		